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UNDERSTANDING SKIN CANCER: A REVIEW

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ABSTRACT

Skin cancer is a common type of cancer that is defined by abnormal skin cell development, mostly as a result of exposure to UV radiation. Melanoma is the most dangerous type of cancer due to its rapid spread, followed by squamous cell carcinoma and basal cell carcinoma.

Early detection, complicated treatments, prevention and awareness, and recurrence risk are major obstacles. Even with these difficulties, if caught early enough, skin cancer is very treatable. Skin cancer can be managed and its effects reduced by promoting sun protection, conducting routine skin exams, and seeking medical attention as soon as changes in the skin seem worrisome.

This article explores the types of skin cancers, the role of UV radiation in skin cancer, as well as the risk and approaches to combating skin cancer. This serves to enlighten the public about the disease.

Keywords: Skin Cancer, Uv Radiation, Melanoma, Non-Melanoma.

I. INTRODUCTION

Skin cancer, which could be melanoma and non-melanoma skin cancer (NMSC) are caused by different factors, while some are unknown, others are a well known fact to most individuals, such as UV radiation. Radiation therapy, chemotherapy, and surgery have all been used in the treatment to date. These therapies, however, have a number of drawbacks, affect the patients, and don't heal problems. They frequently also have an impact on healthy, normal cells without sufficiently harming cancerous cells [1, 2]. Among organ transplant recipients (OTR), skin cancer is the most common cancer, when compared to the overall population [3].

Malignant melanoma refers to cancer cells that develop from mutations in skin melanocytes. Globally, the most common type of skin cancer is non-melanoma skin cancer (NMSC), which arises from the epidermis. It is further characterized as basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) depending on the type of cells involved. NMSC hardly ever migrates into the epidermis's deeper tissues if disregarded, but when discovered early on can it be easily eradicated [4].

II. CLASSIFICATION OF SKIN CANCER

NON-MELANOMA SKIN CANCER

Basal cell carcinoma

Derived from keratinocytes that resemble epidermal basal cells, basal cancer cell (BCC) is the least aggressive type of non-melanoma skin cancer [5]. The most prevalent kind of skin cancer in humans is called BCC. The primary cause of BCC is (i) prolonged sun exposure, (ii) immune system dysfunction, (iv) human

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immunodeficiency virus (HIV), and (viii) beta human papillomavirus [6]. However, being in the sun poses the greatest risk.

Squamous cell carcinoma

The 99% of NMSC patients develop squamous cell carcinoma, a secondary form of skin cancer that develops in the keratinocyte cells of the outer/upper layer of the epidermis and looks like scaly patches of red, firm lumps. It usually affects those who are light-shaded and is caused by overexposure to UV radiation [7].

The development of SCC is brought on by a number of variables, such as having a fair complexion, growing older, burn scars, persistent skin ulcers, immunological suppression, chemical carcinogens, and UV radiation exposure [8].

MELANOMA SKIN CANCER

Aggressive malignant cancers called melanoma originate from melanocytes. Melanocytes are found in the basal layer of the epidermis. a collection of genetic changes that, when exposed to UV light, activate oncogenes, deactivate tumor suppressor genes, and impede DNA repair in organisms. This process could lead to uncontrolled melanocyte proliferation and, eventually, cancer [9].

Acral lentiginous, lentigo malign, nodular, and superficial are the four primary subtypes of invasive cutaneous melanoma. Representing approximately 75% of all melanomas, superficial melanomas are the most prevalent subtype. It has altered in size, shape, or color, and initially seems like a pigmented skin lesion similar to a mole. If it affects men, it usually affects the trunk; in women, it usually affects the legs [10, 11].

Roughly 15% to 30% of occurrences of melanoma are nodular. It is a melanoma that is aggressive and is growing vertically. It grows deeper than it does wider because it does not have a radial growth phase. It could take longer for someone to start having doubts about the lesion as a result. The usual appearance of nodular melanoma is pedunculated or polypoid nodules. Nodular melanomas are firm, symmetrical, uniformly pigmented papules or nodules that can bleed and ulcerate on the heads and necks of older persons [12, 13].

Lentigo maligna is the second most common subtype of melanoma (LM). On sun-exposed areas, it frequently manifests as a small, flat, tan, unevenly bordered, asymmetric macule. The macule may remain in place for many years as it enlarges and begins to change color over time. These melanomas are often called "senile freckles" and are significantly more common in persons over 60. Once they start to become invasive, these could advance swiftly. Their coloring is often varied and their definition is poor. The management of LM is always evolving. When surgery is not a possibility, patients are treated with imiquimod cream in addition to radiation therapy [14, 15]. Surgery is the primary line of treatment when it is available.

The uncommon melanoma subtype known as acral lentiginous melanomas (ALM). This subtype of melanoma is the least common, accounting for about 2 to 3% of all diagnosis. The palms, fingers, toes, soles, and nail beds are typically affected. There is no connection between it and sun exposure, unlike other forms of melanomas.This form of melanoma usually has a worse prognosis than other subtypes, depending on the stage of the disease. Recent therapy approaches, including as immunotherapies and targeted medications, are being studied for their potential to improve the response of patients with advanced ALM, and preliminary results are promising [16,17].

UV LIGHT IN SKIN CANCER

According to several epidemiological research, prolonged exposure to UV light increases the risk of developing skin cancer [18]. The major source of ultraviolet radiation is solar radiation or sunlight. However, exposure to artificial sources particularly through tanning salons is becoming more important in terms of human health effects, as use of these facilities by young people, has increased [19].

Three distinct UV light wavelength ranges can be found in sunlight: UVA (315–400 nm), UVB (280–315 nm), and UVC (100–280 nm). The Earth's ozone layer fully absorbs UVC, leaving UVA and UVB as the primary UV components of earthly sunlight. UV wavelengths determine the quantity and kind of DNA damages that are produced by UV [20, 21]

Different UVA and UVB rays affect skin differently. While UVA and UVB both induce cancer and mutations, UVA also causes photoaging [22, 23, 24]. UVA damages DNA oxidatively, which might result in mutations [25].

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It is well recognized that UVB is the primary cause of UV-induced skin carcinogenesis. In particular, it has been discovered that 315 nm radiation—the boundary wavelength between UVA and UVB—causes more mutations and cancer than other UV wavelengths [26, 27].

It has been demonstrated that melanin shields DNA from UV ray damage. Melanin lowers the rate of 6- 4PP and CPD production in cell culture [28]. Moreover, persons with strongly pigmented skin had significantly less CPD production than those with less pigmentation [29].

Acute UV exposure alters expression of both mRNA and microRNA

On a monthly basis, the International Skin Cancer Foundation advises performing a complete self-examination. Timely melanoma recognition increases survival, from the cancer and its treatment [30, 31, 32].

MECHANISM OF UV LIGHT IN SKIN CANCER

While various factors are linked to skin cancer, constant exposure to UV radiation from sunlight is the primary cause of skin cancer worldwide [33]. A range of molecular mechanisms are involved in UV-induced skin cancers, such as p53 pathway activation, increased DNA damage, inflammatory responses, genetic mutations, oxidative stress, immunosuppression, and induction of apoptotic pathways, which significantly alter cell physiology to cause cell cycle arrest [34].

When exposed to ultraviolet radiation, ultraviolet A (UVA) produces reactive oxygen species (ROS), which interact with molecules of lipids and proteins to produce intermediates that can combine with DNA to form conjugates and break DNA [35]. The most carcinogenic UV radiation that reaches the surface of the planet is UVB, which causes structural damage to DNA and RNA. It starts the formation of covalent bonds between adjacent pyrimidines, which leads to the production of genotoxic photoproducts such as cyclo-pyrimidine dimers and pyrimidine-pyrimidine adducts, which in turn trigger tumor formation and inflammatory reactions. Finally, UVC damage can be repaired by DNA repair enzymes and, in rare cases, is the cause of skin cancer [36]. Geographic differences and the incidence of UVR (lifetime sunshine exposure) are important factors in the proliferation and advancement of skin cells, and they play a role in the development of skin carcinogenesis by disrupting antigen-presenting cells and triggering the creation of immunosuppressive cytokines [37, 38].

RISK FACTORS ASSOCIATED WITH SKIN CANCER

These include biological risk factors as well non biological factors

Skin cancers and viral infectious disorders such as acquired immune deficiency syndrome (AIDS) have been linked. It has been noted that AIDS patients have a three to five times higher risk of non-melanoma skin cancer progression [39].

Many signaling pathways linked to the control of gene expression are often dysregulated in a variety of malignancies, such as skin cancers and non-melanoma ones. One example of this dysregulation is a mutation in the PTCH1 gene, which causes an unregulated proliferation of skin cells and the development of numerous BCCs in an autosomal dominant disease [40].

Similarly, mutations in the MDM2 gene are more likely to induce melanoma in women at an earlier age, while mutations in the CDKN2A gene are the most frequently found cause in males [41].

Cancer rates are on the rise due to environmental stressors such noise pollution, exposure to air pollutants, and artificial nighttime lighting [42].

Regarding nutrition, a number of epidemiological studies have consistently demonstrated a link between nutrition and skin cancer. It has been shown that diets high in omega-6 fat promote carcinogenesis by decreasing tumor latency and increasing tumor multiplicity [43]. On the other hand, a low-fat diet may considerably reduce the incidence of skin malignancies other than melanoma [44].

Skin colour; It has been demonstrated through experimentation that white Caucasian skin, both melanoma and non-melanoma, is more dangerous or risky than skin with pigmentation. The reduced prevalence of skin cancers in darker-skinned races is mostly due to more melanin in the epidermis, which filters twice as much UV light as that in the epidermis of Caucasians [45].

People of color often have skin cancer that appears later in life, which worsens their prognosis compared to White people. individuals of color with skin cancer have worse rates of morbidity and death than do White

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individuals [46]. One type of NMSC that is more common in people with darker skin is squamous cell carcinoma, whereas another type of NMSC that is more common in people with Caucasian skin is basal cell carcinoma [47, 48].

III. APPROACHES TO COMBAT CANCER

The following mentioned are few out of the various approaches that can be used to fight against skin cancer.

Sunscreen: Use of sunscreen is not a treatment method, but rather a preventive method. By using sunscreen with a broad spectrum protection factor (SPF) range of at least 15 [49]. we can use this to control the direct effects of UV radiation since it is already established that UV radiation is one of the most common causative agents of skin cancers. Avoid prolong stay under high sunlight as well as avoid getting sun burns, Also visit a dermatologist at least once a year or once in 6 months to get professional treatment

Simple excision surgery

Simple excision involves completely cutting out the tumor-related area along with some healthy body cells or tissues, stitching the incision site closed, and then sending the removed tissues—which have been examined by a dermatopathologist—to a lab for analysis to ensure that the entire tumor area has been removed [50].

Immunotherapy

Immunotherapy is a cutting-edge method of treating cancer by generating antigen-antibody interactions. By attaching to receptors on target cells, interferon plays a significant role in immunotherapy, a treatment for cancer. Interferons suppress growth factor and mitosis, activate genes that promote apoptosis, and stimulate antiangiogenic activity in cancer cells to create antiproliferative effects. They also help the immune system combat substances that cause cancer [51].

Photodynamic therapy

Multiple, thin, nonhyperkeratotic AKs can be treated noninvasively using photodynamic therapy (PDT) [52, 53]. Applying methyl-aminolevulinate (MAL) or aminolevulinic acid (ALA) to the targeted area of the skin first causes it to be absorbed and accumulate inside dysplastic and neoplastic cells up to 10 times more quickly than it does in normal cells [54,55]. It becomes protoporphyrin IX, a powerful photosensitizer that activates in response to light and causes the production of reactive oxygen species as well as the death of dysplastic cells [56]. PDT patients frequently report burning, itching, and stinging at the treatment site. After treatment, there may be visible erythema, scaling, and crusting, but often the area heals without showing any signs of scarring [57].

Lasers

Tumors are destroyed by lasers by the induction of coagulative necrosis, ablation, and hyperthermia. The management of NMSCs may now have a novel, successful treatment option in the form of lasers, according to numerous research [58, 59]. Lesions in the superficial epidermis at risk of developing into AKs, SCCs, and possibly BCCs can be eliminated with a single pass of a CO2 laser [60].

The application of neodymium (Nd) lasers for the treatment of facial skin malignancies was evaluated in a study by Moskalik et al [44]. Using pulsed Nd and neodymium-doped yttrium aluminium garnet (Nd:YAG) lasers, 3,461 patients with 3,534 BCCs and 90 SCCs were monitored for three months to five years. Recurrences were observed in 1.8% of BCC patients treated with pulsed Nd laser, 2.5% of BCC patients treated with Nd:YAG laser, and 4.4% of SCC patients treated with pulsed Nd laser. One effective treatment option for facial skin malignancies is radiation utilizing Nd lasers [61].

Radiotherapy

In radiation therapy, the tumorous area's outer skin surface is the only area that receives radiation. Radiotherapy uses low energy x-rays (superficial radiation therapy) or electrons (electron beam radiation), which don't pierce the skin more deeply [62]. One of the most common forms of treatment for skin cancer patients is radiotherapy.

IV. CONCLUSION

In cases of skin cancer, early detection and treatment are essential to a successful outcome. Raising awareness among the general public about the value of sun protection and routine skin checks can greatly lower the

frequency and severity of this illness. For individuals who are more vulnerable, routine follow-ups are crucial to successfully managing and preventing recurrence.

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